Research Division

Tools for Better Transportation Tomorrow

What's HOT

Mobile Retro-Reflectivity Van Available on Request

By: Barry Sharp, Research New Products Coordinator

Four years ago the Utah Department of Transportation (UDOT) Research Division inherited a mobile reflective reading van capable of reading traffic marking reflectivity at 50-Miles Per Hour (MPH). The van was part of a research project performed by the Central Maintenance Division under the guidance of Mr. Vincent Liu, Maintenance Methods Engineer.

UDOT Central Maintenance in coordination with the FHWA utilized the van for 3 years in order to develop repeatable readings, and utilize the sophisticated equipment contained in the mobile van unit.
Late in 2005 the Research Division was able to take possession of the van and train three of its folks to operate it. As it is used more, the potential for consistent results and a high operating dependability will be assured.

A successful warranty traffic-marking requirement may be instituted regardless of the product. A time line will govern each traffic marking installed under a warranty condition regardless of the type.
The Research Division welcomes and will respond to state wide requests for reflective readings on warranted marking and other markings that may be in question regarding adequate retro-reflectivity. For information, please contact Mr. Barry Sharp, UDOT New Products Coordinator at (801) 965-4314 or rsharp@utah.gov or Mr. Vincent Liu, Maintenance Methods Engineer @ vliu@utah.gov.

A Whole Lotta Shaking Goin' On-Or About To:

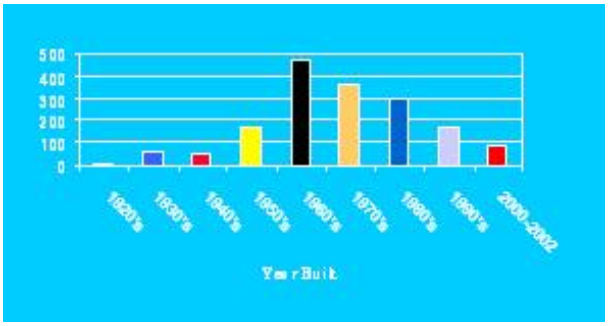
By: Blaine Leonard, Research Project Manager

At a workshop on June 1, 2006, UDOT engineers and bridge inspectors were reminded that there is a 14% probability of a large earthquake along the Wasatch Front in the next 50 years. This is the same probability as our individual chance of having a heart attack. The workshop provided insights on how to prepare for the event and how to respond.

The Post-earthquake Bridge Inspection Workshop was presented by the Technical Council on Lifeline Earthquake Engineering (TCLEE) of the American Society of Civil Engineers (ASCE), in conjunction with the UDOT Structural Operations and Research Divisions.

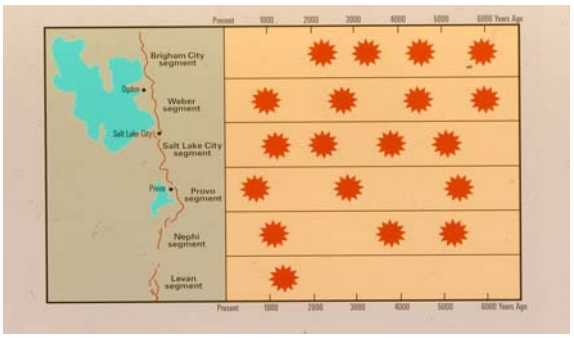
Presenters at the workshop included engineers and geologists from CalTrans, South Carolina DOT, Brigham Young University, the University of Utah Seismograph Station, the Utah Geologic Survey, Psomas, and UDOT. About 40 people attended, and participated in presentations and discussions about the earthquake risk in Utah and the kinds of damage to look for after a seismic event.

Dave Eixenberger, the UDOT Structures Operations Engineer, outlined for the group the essence of UDOT's bridge emergency response plan. Key features in the plan include:



1) knowing the bridge inventory and having a hard copy available,
2) understanding the roles and responsibilities of various UDOT employees,
3) understanding the triage process of what to look for and how to prioritize damage,
4) having and using a communication plan, and
5) effectively using the tools available to collect and assess damage data.

Since 70 percent of our bridges were built before the adoption of the earthquake design code, many of our structures are particularly vulnerable.



Kris Pankow, of the University of Utah Seismograph Station, stressed the importance of being prepared because of the dual threat in Utah: infrequent, large (M7.0), surface-rupturing earthquakes on active faults, and more frequent, moderated-sized earthquakes (below M6.5) which can cause damage if they occur in an urban area. Large earthquakes along the northern Utah segments of the Wasatch Fault occur, on average, every 350 years. The most recent was about 500 years ago. Smaller events, magnitude 5.0 and above, occur every 10 years. The last one in northern Utah was in 1989. We are overdue and need to be ready.

California has had its share of devastating earthquakes, and Mark Yashinsky, from CalTrans, described what kind of damage he has observed, and how they learned from each of these events. Design details in column reinforcement, seat widths, structural connections, and rebar development lengths are all essential components to surviving a seismic event, and have been altered over the years as a result of forensic evaluations. Dr. Les Youd, of BYU, who, like Mark Yashinsky, has visited post-earthquake sites all over the world, stressed the importance of quick, effective, post-event inspection of bridges. This in not only critical to public safety, determining which structures can safely carry traffic, but also necessary as input to a disaster declaration. In addition, it is important that we understand whether the structure responded as we expected it to, and if not, that we know why. He described numerous structural failures, in places like Turkey, Japan, and Costa Rica, which resulted from fault rupture, liquefaction, and lateral spreading of soils. Liquefaction susceptible soils are prevalent in the Wasatch Front valleys.

The purpose of this workshop was to help UDOT engineers and inspectors be better prepared to respond to earthquake events. Mark Yashinsky stressed that "we don't want to be playing catch-up – we need to be ready ahead of time". This workshop was just one step, facilitated by the Research Division, to help us be ready.

For more information, please contact Mr. Blaine Leonard, Research Project Manger of the UDOT Research and Development Division at (801) 965-4115 or bleonard@utah.gov.

Implementation of Drainage Features at MSE Wall and Review of Drainage Design Considerations for MSE Walls

By: Clifton Farnsworth, Civil Engineer III

One of the primary concerns that was identified during a TRB presentation on MSE wall drainage considerations was accounting for water within the wall. If the water is going to be there, then the wall needs to be designed for it. Otherwise keep the water out.

Figure 1. Drain mat to intercept water seeping out of the slope.

During construction of MSE Wall A (June, 2005) in the current Provo Canyon Construction project, a section of the native slope that was to be behind the wall had a lot of water seeping out during the wet winter and spring runoff months. To capture this water, a drain mat was placed against the native slope to intercept the water before it got into the wall itself. A slotted drain pipe was then placed at the bottom of the mat and tied into the existing drainage system to provide a place for the water to exit. This was something that was new and unique to anything that we had done with MSE walls before, but a perfect application of the TRB recommendation to account for the potential water within the wall. Although there was some minor cost associated with placing the drain mat, this was minimal when compared to what it would have cost to fix a portion of the wall had there been a blow out at some time in the future. For more information about MSE walls, please contact Mr. Farnsworth at cliftonfarnsworth@utah.gov or the UDOT Geotechnical Division at (801) 965-4234.

Figure 2. Drain mat placed behind MSE Wall A through seepage zone.

Upcoming Events

By: Abdul Wakil, Research Technology Transfer Engineer

The ongoing Technology Transfer Program is a crucial aspect of our business. Every month we ask an expert and hold a Technology Transfer Session on a hot topic within UDOT. The following is the List of upcoming library technology transfer sessions:

Date	Subject	Presenter (s)	Division
08/10/06	Stewardship/Oversight Agreement	Mr. Richard Miller	UDOT Engineering Services
08/17/06	Design Exception/Design Waiver/Deviation from UDOT Standards	Mr. Richard Miller and Mr. Barry Axelrod	UDOT Engineering Services
08/17/06	Concept Report	Mr. Steven Anderson and Ms. Patti Charles	UDOT Engineering Services
08/30/06	Rockfall Hazards	Mr. Blaine Leonard	UDOT Research and Development
08/31/06	Design Exception/Design Waiver/Deviation from UDOT Standards	Mr. Richard Miller and Mr. Barry Axelrod	UDOT Research and Development
08/31/06	Concept Report	Mr. Steven Anderson and Ms. Patti Charles	UDOT Engineering Services
09/05/06	New Products Evaluation	Mr. Barry Sharp	UDOT Research and Development

Local Upcoming Events

Date	Subject	Place
08/08/06	ITS Experiences with Applications (Washto-X Videoconf.)	UDOT Lester Wire Technology Transfer Room
09/12/06	Landslide & Rock Fall Mitigation Systems (Washto-X Videoconf.)	UDOT Lester Wire Technology Transfer Room
09/12/06	Understanding Geotechnical Reports and Designs in Utah Seminar (Commercial)	Hilton Salt Lake City Center. 255 West Temple
09/14/06	Third Annual Stream Restoration and Rehabilitation Conference (UDOT)	Salt Lake community College, Miller Campus, 9750 South 300 West
10/17/06	Bridge Maintenance & Water Quality Issues: Washing off Bird Refuse, Painting Preparations, & Other Bridge Maintenance Problems (Washto-X Videoconf.)	UDOT Lester Wire Technology Transfer Room
11/14/06	Traffic Safety, Maintenance Activities, & Incident Response (Washto-X Videoconf.)	UDOT Lester Wire Technology Transfer Room
12/12/06	Technology Transfer & Implementing Research (Washto-X Videoconf.)	UDOT Lester Wire Technology Transfer Room

National Upcoming Events

Date	Subject	Place
07/30/06	Second International Transportation Technology Transfer Symposium	St. Petersburg, Florida.
09/18/06	5th National Seismic Conference on Bridges and Highways http://www.trb.org/news/blurb_detail.asp?id=5737	San Francisco, California
11/02/06	2006 Toward Zero Deaths Conference http://www.tzd.state.mn.us/news/2006/conferenceinfo.html	Duluth, Minnesota
01/21/07	Transportation Research Board (TRB) Annual Meeting	Washington DC
05/01/07	18th Annual CTS Transportation Research Conference, conferences5@cce.umn.edu	St. Paul, Minnesota

If you would like to know more about the above events, please contact Abdul Wakil, Technology Transfer Engineer @ awakil@utah.gov or (801) 964-4455.

UDOT Lester F. Wire Library Corner

Mail Policy & Procedures

By: Mumtaz Mullahkhel, Library Technology Transfer Technician

In an effort to make the system work better, the mail policy and procedure for UDOT employees was revised in June 2006, emphasizing the importance of using assigned box numbers and the 84114 zip code. The revision was necessary in order to streamline the process for handling mail at the Complex and to make certain all incoming correspondences are delivered in an efficient and timely manner. The benefits to employees include direct delivery of mail to assigned box numbers and faster delivery time.
As with all State agencies, UDOT has been assigned a unique zip code by State Mail Services in conjunction with the United States Postal Service. This zip code enables State Mail Services to perform its duties by receiving, sorting and delivering all mail to intended recipients without relying on a third party. The use of a non-84114 zip code and box number unfortunately caused the mail to be routed automatically to the Lester Wire Library for processing. The staff at the library methodically sorted the mail, searched the recipient's box number, marked the correspondence with a purple pen and then

forwarded the mail to the intended recipient. Though it sounds thrilling, this additional process actually delayed the mail 24 hours!

Many thanks go to those who assisted in the revision, including Ms. Julie Lewis, Ms. Kitty Wright, Ms. Tori Gagon, Ms. Rae Ann Jensen and Mr. Abdul Wakil.
Mumtaz strives to make the mail process more efficient for the department and if you have questions or need more information, please feel free to contact Mumtaz Mullahkhel at (801) 965-4626 or mmullahkhel@utah.gov

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UDOT Records Archive

By: Rae Ann Jensen, UDOT Archive Coordinator

Exciting things have been happening in regards to the way UDOT'S records are being handled and stored. December 2005 was the deadline to have all of the records cleared out of the storage area in the MTF building. WOW. At first this task looked so overwhelming, I didn't really think it could be done. It was a great deal of work but with everyone's help and cooperation the deadline was met. Since then a lot of changes have been made. Division heads have assigned Records Officers to each area. These officers have attended training and are now utilizing the State Records Center and Archives to store UDOT's records.

The facilities at State Archives and at the State Records Center are climate controlled, temperature controlled and it is a secure area. They also have more staff there so they can devote the time and effort needed to handle and maintain the records.
The different Regions are also cooperating by meeting with each other to see who is creating what records, who and where they are being stored, and creating record series numbers for each region's records. As a result of clearing out the MTF Record Storage Facility the Policy and Procedure 05B-3 was totally outdated. You can read the updated Policy and Procedure on the Inner Web after it gets approved by the UDOT Technical Committee Members.

Rae Ann is available to answer any questions regarding records and she strives to make UDOT the agency with the best Archiving system. She would like to extend her thanks to all those who have been a part of making these improvements happen. For more information on archiving, please contact Ms. Jensen at raeannjensen@utah.gov or (801) 965-4656.

Why is it important to have an in-house library?

By: Abdul Wakil, Research Technology Transfer Engineer

National Data support the idea of having an in-house library and shows its benefits to internal and external agency customers.
The following items are from information prepared by the Volpe National Transportation Systems Center and the Minnesota DOT Library Website:

- In the private sector, Texas Instruments calculated a 515 percent return on its investment in Library services.
- In a study by Griffiths and King, it concluded that the overall return on investment for supporting an in-house library ranges positively from a low of 7.8 to 1 to a high of 14.2 to 1.
- In FY01 MN/DOT Library services provided an estimated total of $8,386,500.00 in reduced costs and added value for a benefits to cost ratio of 12:1.
- Minnesota DOT (MN/DOT) employees' reading of the 4,500 requested information resources provided by the library provided an estimated value of $5,100,000 and MN/DOT employees' reading of the 40,000 information resources provided through the library's routing services provided an estimated value of $2,400,000.
- Viewing and use of MN/DOT Library's web pages provided an estimated value of $47,250.

- A subsidiary of another major U.S. manufacturer found that the information produced by a Series of literature searches performed by its corporate library was worth about $400,000—and cost the company just $17,000.
- According to Griffiths and King (1993), firms without libraries spend 2 to 4 times more to acquire information than those with in-house libraries.
- Texas Instruments' library in Houston reported that 81 percent of the users sampled felt that the library's services had a positive impact on their jobs.
- In a survey conducted by the library, users' responses indicated that the library saved the company $268,800 a year and increased users' job proficiency by a value of $523,000 a year. From an annual investment in the library of $186,000 a year, Texas Instruments netted $959,000 in benefits—a 515 percent rate of return. For example, the Georgia Technical Institute installed a campus-wide on-line library system in 1986 and reduced the costs of its literature searches by $1.2 million a year.

References:

Value of Information and Information Services" prepared by Volpe National Transportation Systems Center U.S. Department of Transportation Research and Special Programs Administration and
Minnesota DOT Library Website.

A Look At Who We Are

By: Abdul Wakil, Research Technology Transfer Engineer

New Members of the Research & Development Division?

Mr. Michael Fazio is our new Deputy Research & Development Engineer.
Michael brings a variety of great engineering experiences and work ethics to the research division. Mr. Fazio has been with the Utah Department of Transportation (UDOT) for a little over ten years and has held various engineering positions in design and construction prior to assuming a position in Research. Michael was the head of UDOT Hydraulics Division for approximately four years before moving to Research.
Michael's major responsibilities include research innovation, assisting in the management of the Research Division, and managing the Zero Based Budgeting (ZBB) effort in Project Development. Mr. Fazio is always willing to help and answer your questions. Michael could be reached at mfazio@utah.gov

An ongoing feature of our quarterly newsletter is an introduction to one of our Research and Development Division staff member. In this edition, we will introduce to you Ms. Rae Ann Jensen. Rae Ann has been with the department for over 22 years and she is the Archive Coordinator for UDOT and takes care of the daily mail for the department. In February of this year, Rae Ann moved up to the Structures division where she is the secretary for Bridge Operations and Design. This has been a very positive move for her and has given Rae Ann the opportunity to learn a lot of new things and meet a lot of great people.
Ms. Jensen likes to travel, play games, cards, scrap booking, crafts, camping and just hanging out with her kids. If you need information about the above, please contact Ms. Jensen at (801) 965-4656 or raeannjensen@utah.gov

You Know You Need To Contact Research When…

By: The UDOT Research & Development Division

- **You require any technology transfer information or any experimental feature tested.**
- **You would like to learn more about how a new product performs on the road.**
- **A new product is introduced on a project that is proprietary.**
- **A product is going to be used that is not on the apl/pdpl.**
- **You have a brilliant idea and/or product and would like a team of brilliant dedicated people to research it.**
- **You are introduced to a promising technology and do not have time and funding to test it.**
- **You are in need of information because "if you don't get it, you don't get it."**
- **You have a problem to be solved or you want to become more efficient.**
- **You require diligent inquiry about a subject matter and an analysis of scientific data.**

Completed UDOT Research

Research publications are our valuable resources. For a list of recently completed Research Projects, please visit the Research & Development website at: http://www2.udot.utah.gov/index.php?m=c&tid=235. If you would like to obtain an electronic copy or a printed copy of our completed research, please contact awakil@utah.gov

- **Contact US @ http://www.udot.utah.gov/index.php/m=c/tid=240**
- **Research Home: http://www.udot.utah.gov/index.php?m=c&tid=195**
- **Published Reports: http://www.udot.utah.gov/index.php/m=c/tid=235**
- **I-15 Test Bed: http://www.udot.utah.gov/index.php/m=c/tid=233**
- **Links: http://www.fhwa.dot.gov/webstate.htm**

Please send your comments and questions about this Newsletter to Abdul Wakil awakil@utah.gov or (801) 964-4455